Problem 1. [10 Marks] Homes are typically appraised before sale. Appraisers hired by lenders such as banks have an incentive to assign a higher value to a house (so the home loan will be larger), while borrowers' appraisers might be inclined to value the same house at a lower price. The article "Distressed Properties: Valuation Bias and Accuracy" (J. Real Estate Fin. Econ. 2010) describes a study in which a random sample of 20 residential properties being purchased in New Orleans after foreclosure was selected. Each property was appraised both by the borrower and by the lender, resulting in the data (in thousands of dollars) given in the accompanying Excel file.

a) Obtain a 95% confidence interval for the difference of the lender's assessment from the borrower's assessment. What can you infer?

b) State the null and the alternative hypotheses to test whether the lender's assessment is higher than the borrower's assessment.

c) Plot the data and comment if the use of a t-test can be justified.

d) Calculate the value of appropriate test statistic and calculate the corresponding p-value. You may use the R function t.test. What is your conclusion at the 5% level of significance?

e) Stating the null and alternative hypotheses clearly, perform a Wilcoxon signed-rank test at the 5% level of significance in the context of this problem.

Problem 2. [10 Marks] In order to compare the cleansing action of three brands of detergents, 24 swatches of white cloth were soiled with red wine and grass stains and then washed with the respective detergents. The whiteness readings obtained are given in the accompanying Excel file. At 5% level of significance, test whether there are some differences in the average whitening effectiveness of the three detergents. Write the hypotheses, and the steps involved clearly.

Problem 3. [15 Marks] Please go through the case "The Professor Proposes" and help the professor to make a decision by using the methods you have learnt in this course. The dataset and the case are already shared with you.